Undergraduate Catalog of Courses

Volume 2011 *2011-2012* Article 8

7-1-2011

Biochemistry

Saint Mary's College of California

BIOCHEMISTRY

Biochemistry is the study of biological phenomena using chemical principles. The Biology and Chemistry departments jointly offer a major in biochemistry to serve students whose scientific interests lie at the intersection between biology and chemistry. Majoring in this important interdisciplinary field will prepare students for a variety of options upon graduation: employment in the biotechnology, pharmaceutical, or similar industries; graduate work in biochemistry or many related fields; entry into professional schools such as medicine or dentistry; or teaching at the K–12 level. Using a balance of theoretical and experimental work, the curriculum attempts to provide students with a solid understanding of fundamental concepts, the ability to reason through unfamiliar problems, the tools to investigate a topic in depth, and the communication skills that are needed to share information with others.

By majoring in biochemistry, students will fulfill many learning outcomes that can be arranged under three broad categories: 1) Obtain a solid foundation in fundamental biochemical concepts; 2) Acquire the tools to independently investigate a topic; 3) Develop habits of critical thinking and communication that can reinforce many of the College's core curriculum goals.

FACULTY STEERING COMMITTEE
Kenneth J. Brown, Ph.D., *Professor*
Vidya Chandrasekaran, Ph.D., *Assistant Professor*
Jeffrey A. Sigman, Ph.D., *Associate Professor*

LEARNING OUTCOMES
The learning outcomes for the biochemistry major are organized into three general categories. Students graduating in the biochemistry major will:

- OBTAIN a solid foundation in the fundamental language and concepts of biochemistry and an understanding of issues at the forefront of the discipline
- DEVELOP skills required for critical thinking and independent investigation
- DEVELOP skills of communication and collaboration

ADMISSION REQUIREMENTS
Students planning a major in biochemistry must present credits in one year of chemistry, one year of physics, and four years of mathematics, and should have at least a B average in these subjects. Students with a good high school record but lacking credit in any of these subjects should remedy any deficiencies in summer school. Students majoring in a science should be particularly alert to the language proficiency requirement.

MAJOR REQUIREMENTS

This major is interdisciplinary, bridging the two fields of biology and chemistry, so the lower-division requirements are nearly the same as those for the two respective major programs. The lower- and upper-division courses in this major are listed on the Biology and Chemistry Department pages (See page 73 and 85 respectively).

LOWER DIVISION
The following lower-division courses are required for the biochemistry major: **Biology 1, 1L, 2†, 2L†; Chemistry 8, 9 (lab), 10, 11 (lab); Mathematics 27, 28; Physics 10/11** and **20/21** or **Physics 1/2 and 3/4, and Chemical Literature 89.**

UPPER-DIVISION REQUIREMENTS
There is a core of upper-division courses for this major which include two semesters of Organic Chemistry (**Chem 104** and **106**); Biochemistry (**Bio 135**), Advanced Topics in Biochemistry (**Bio/Chem 136**), and Molecular Biology (**Bio 137**). Students are also required to take either Biophysical Chemistry (**Chem 138**) or Physical Chemistry (**Chem 114** and **115**). For additional laboratory skill development, students are required to take either Separation and Identification (**Chem 108**) or Instrumental Chemical Analysis (**Chem 118**). For upper-division electives, students may choose two courses from the following categories listed below.

Upper-division electives: Select two of the following categories (a, b, c or d):

a) **Biology 105** – Genetics
b) One of the following:
   Biology 102 – Embryology and Development
   Biology 127 – Systemic Physiology
   Biology 130 – Microbiology
   Biology 132 – Cell Biology
   Biology 139 – Immunology
c) **Chemistry 130**§ – Advanced Inorganic Chemistry
   or
   Chemistry 111 – Advanced Organic Chemistry
d) **Chemistry 114**§ – Physical Chemistry I

Students are strongly encouraged to participate in research, either during a summer or during the academic year.

† *Required for students with more of a biological interest and chemistry students who wish to take* ***Biology 105: Genetics***

§ *Students wishing to meet the ACS curriculum requirements for the biochemistry major must take two semesters of Physical Chemistry (**Chem 114** and **115**) and Advanced Inorganic Chemistry (**Chem 130**).*

PREREQUISITE GRADE
Any course listed in this major with a prerequisite assumes a grade of C– or better in the prerequisite course. The lower- and upper-division courses in this major are listed on the Biology and Chemistry Department pages (See page 73 and 85 respectively).